Montgomery County
Water Quality Advisory Committee
Forest Conservation Advisory Committee
November 15, 2011

Turf to Trees

Rural Residential Reforestation in Baltimore County

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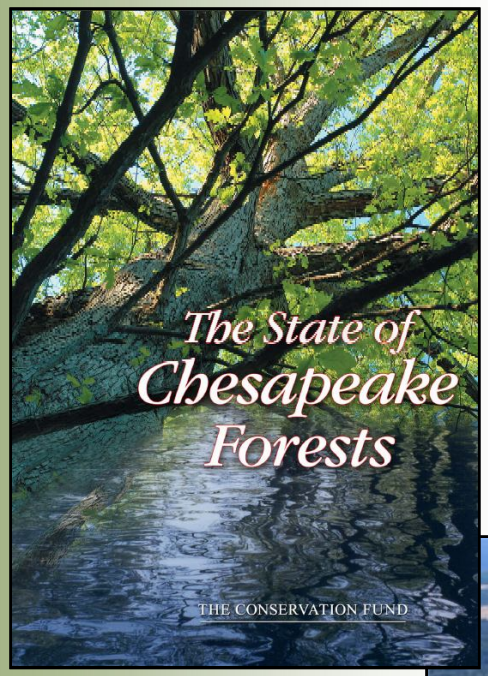
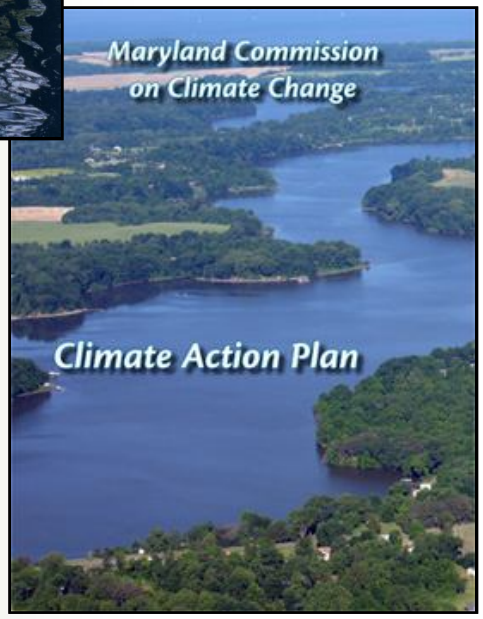
Forests: The Key to Watershed Function and Climate Change Mitigation

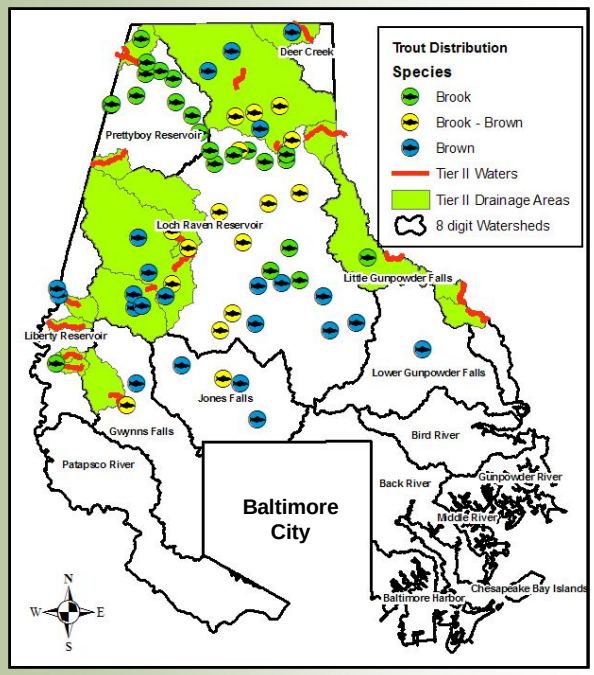


"Forests are the most beneficial land use for promoting and maintaining clean water. While forests cover 58% of the Chesapeake Bay watershed, they contribute <15% of total nitrogen and 2% of total phosphorus loads to the Bay. The health of a watershed is directly tied to the amount of forest and tree canopy cover, the quantity of intact riparian forests, and the health, condition, and distribution of its forested lands."



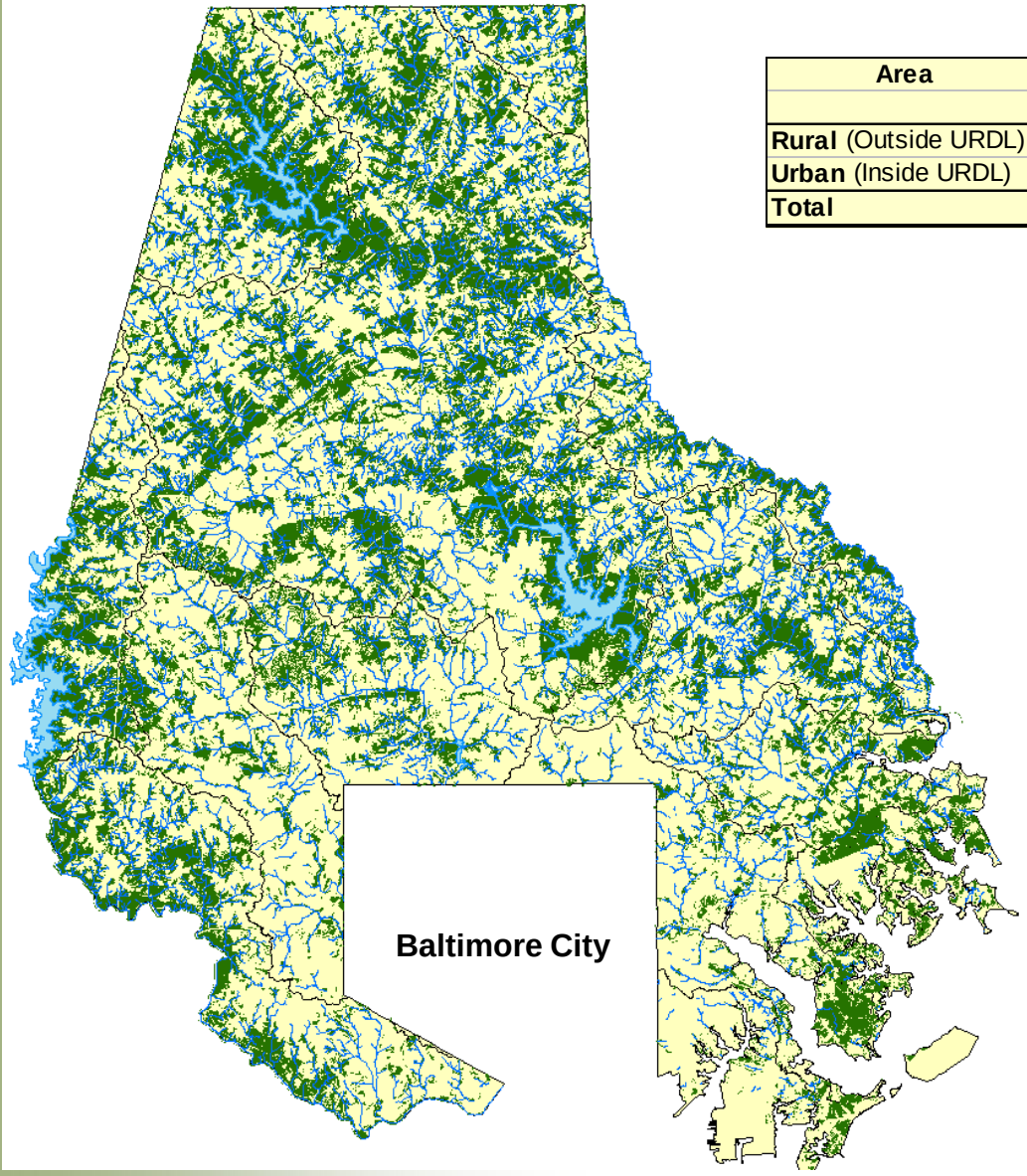
"In the face of climate change, it is critical that everything possible is done to increase the amount of, and enhance the condition of forests and trees everywhere. Healthy forests and trees are our single most cost-effective tool for mitigating for climate change."

Forests and Trees: Strategic Local Tools



- Chesapeake Bay WIP II (mainstem TMDL)
- 8-digit watershed TMDLs (23) & Tier II waters
- NPDES MS4 Stormwater Permit
- Reservoir Watershed Management Agreement
- Baltimore Watershed Agreement
- Master Plan 2020 (Water Resources Element and Sensitive Areas Protection Element)
- County Forest Sustainability (forest health assessments & management plans; wood waste biomass energy; urban and rural reforestation)
- Energy Sustainability (CO_2 emissions reduction goal)
- No Net Loss of Forest Policy

Forest Conditions in Baltimore County



Tree Canopy Cover:

Area	Total Land (acres)	% of County	Forest Canopy		
			Acres	% of Forest	% of Area
Rural (Outside URDL)	254,171	66.1%	137,128	73.21%	54.0%
Urban (Inside URDL)	130,541	33.9%	50,168	26.79%	38.4%
Total	**384,713**	**100.0%**	**187,296**	**100.00%**	**48.7%**

Forest Land Use:

- 34% County-wide (132,000 ac.)
- 45% reservoir watersheds
- 52% stream buffers

Ownership: 75% private

Green Infrastructure areas: Public

Fragmentation:

- >9,000 patches; 315 >100 ac.
- 14.6 acre mean

Parcelization:

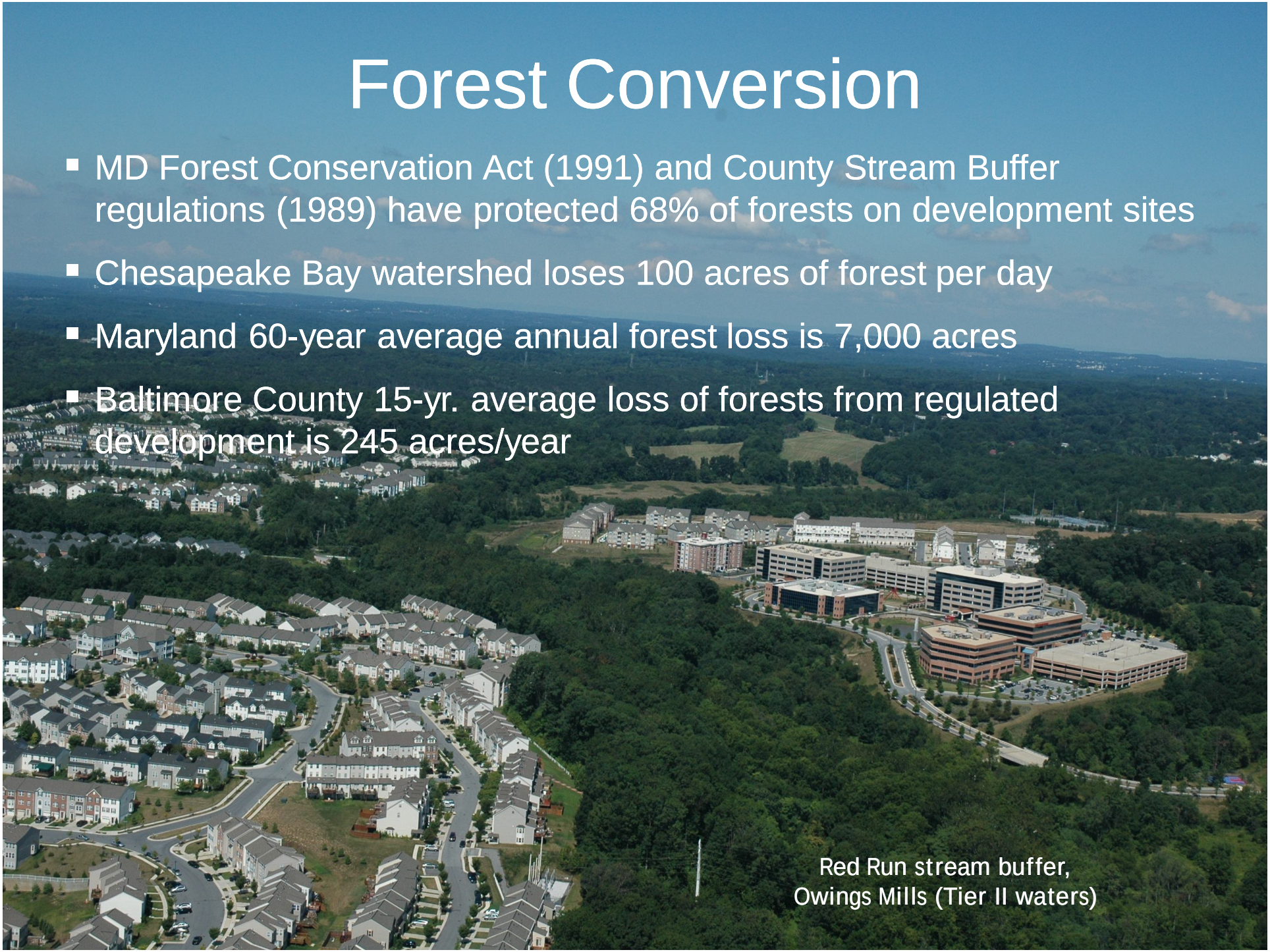
- 40-50,000 owners ?

Forest Health Threats:

- Pests (Gypsy moth, deer)
- Diseases
- Invasive species
- Inadequate regeneration

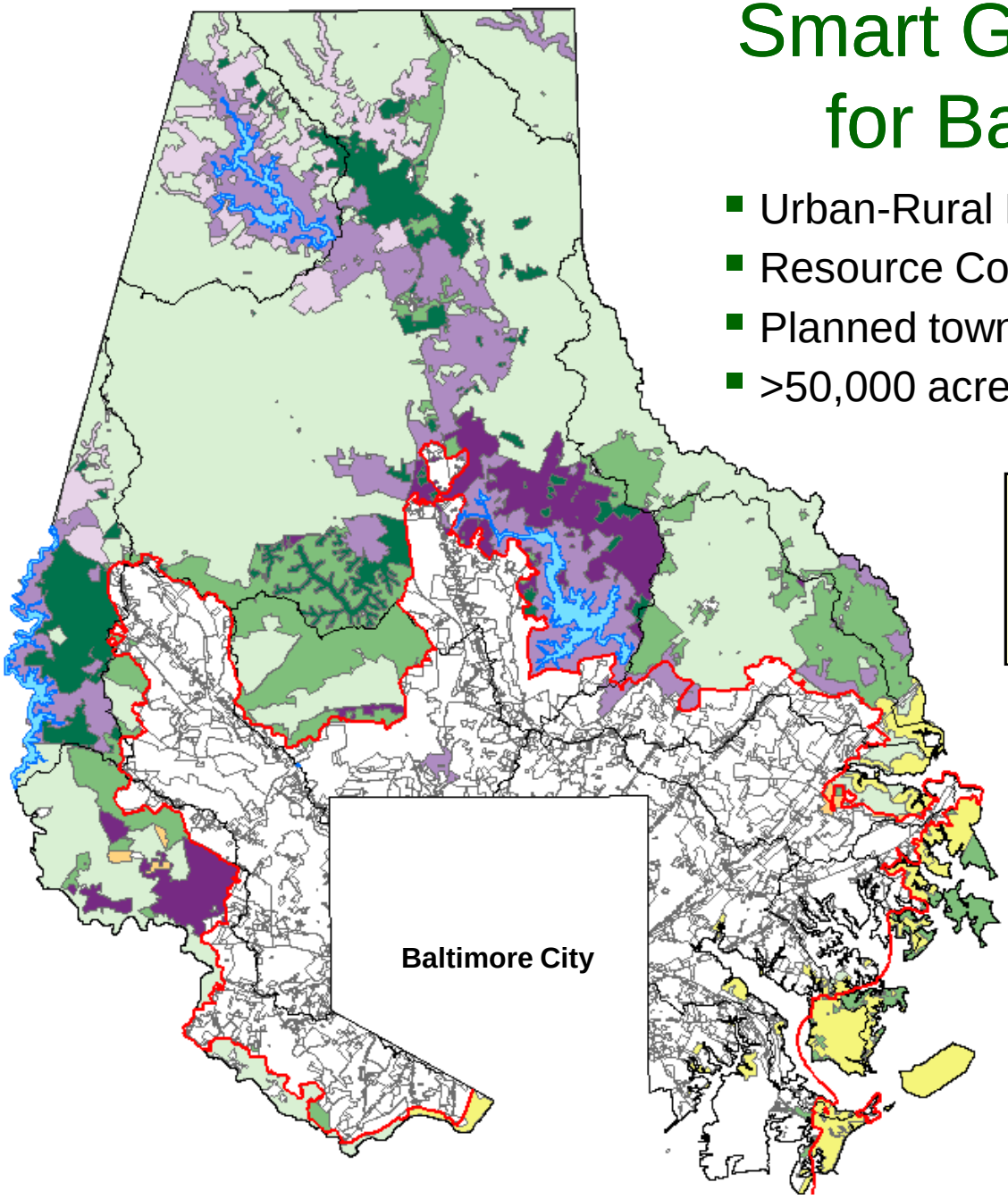
Forest Conversion

- MD Forest Conservation Act (1991) and County Stream Buffer regulations (1989) have protected 68% of forests on development sites
- Chesapeake Bay watershed loses 100 acres of forest per day
- Maryland 60-year average annual forest loss is 7,000 acres
- Baltimore County 15-yr. average loss of forests from regulated development is 245 acres/year



Red Run stream buffer,
Owings Mills (Tier II waters)

Smart Growth Framework for Baltimore County



- Urban-Rural Demarcation Line (URDL, 1967)
- Resource Conservation (RC) zoning (1975)
- Planned town centers & redevelopment
- >50,000 acres in land preservation since 1980

87% of the County's 800,000+ people live inside the URDL on 1/3 of the land

Major RC Zones - 2008

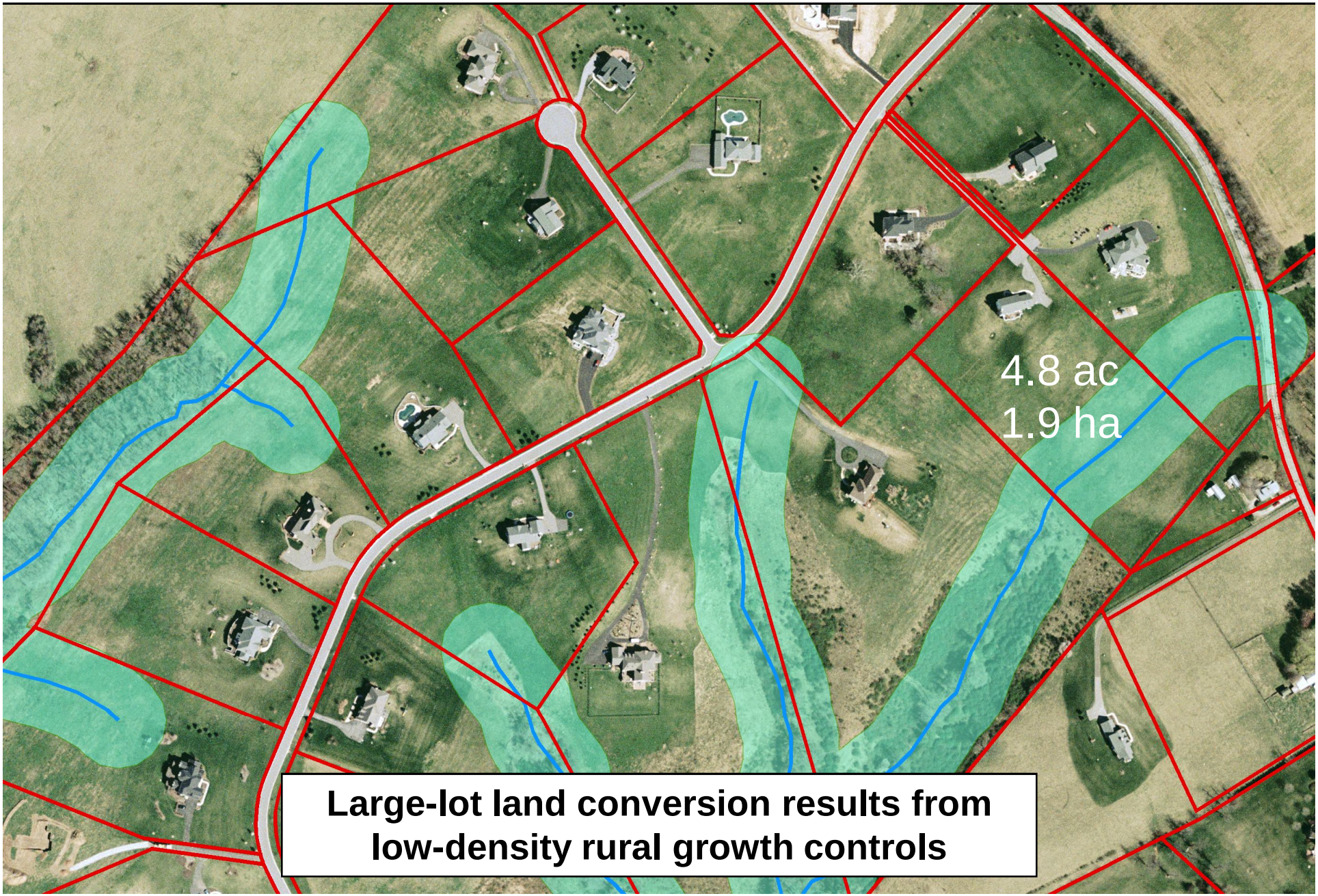
- RC 2 (1 du/50 ac)
- RC 4 (1 du/5 ac)
- RC 5 (1 du/2 ac)
- RC 6 (1 du/5 ac, net)
- RC 7 (1:25 if >50 ac)
- RC 8 (1:50 >50 ac)
- Critical Area
- URDL

Priority Forest Strategy

- Reduce the rate of forest **conversion** - “keep forest as forest”
- Strategically **re-forest** stream buffers, areas adjacent to existing forests, and urban areas
- Restore and maintain forest **health**
- Provide **stewardship** incentives for private landowners who control 75% of total forest cover

Forest Parcelization

“I didn’t want all of this land, it just came with the house.”




“mindless mowing of excess lawn”

Land Cover for Rural Residential Parcels

"Excess lawn" is existing grass area on a parcel in excess of 1 acre of grass

On this 4.8 acre lot, all grass other than the house/driveway and 1 acre of lawn is "excess lawn"

- GIS analysis of 28,181 parcels classified in land use database as rural residential:

Land Cover	Acres	%
Total lot area	60,596	
Grass/lawn .	20,278	33.5%
Tree canopy	36,778	60.7%
Bldgs & roads	1,915	3.2%
Water & other	1,625	2.7%
Excess grass/lawn	7,136	
Potential canopy	43,914	

- Of the total rural residential parcels, 1,913 have 1-10 acres of excess lawn:

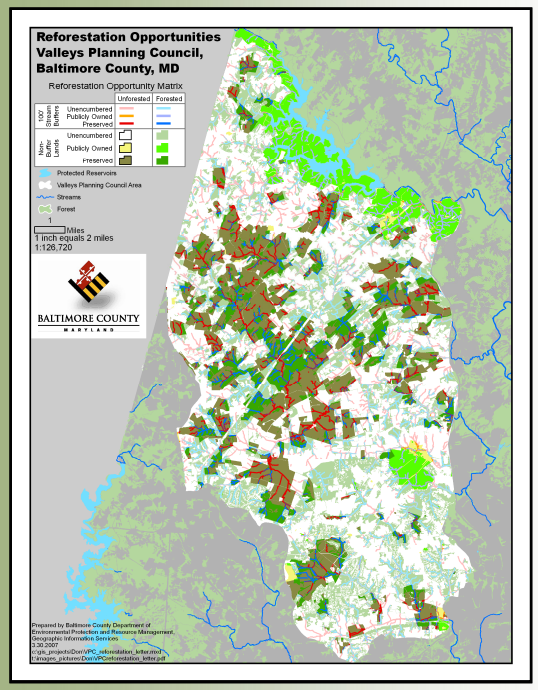
Land Cover	Acres
Total lot area	11,917
Existing canopy	4,970
Excess grass	4,527

- There appears to be significant potential to convert excess lawn to forest cover.

Project Goals

- To protect and improve habitat and water quality by increasing forest cover along stream buffers and contiguous forest patches, primarily in reservoir watersheds.
- To educate rural residential lot owners (and improve stewardship capacity) about their role as managers of larger forest and stream systems shared with other lot owners.
- To reduce barriers and provide incentives to landowners for conversion of mowed, “excess lawn” areas to new forests.

Project Overview



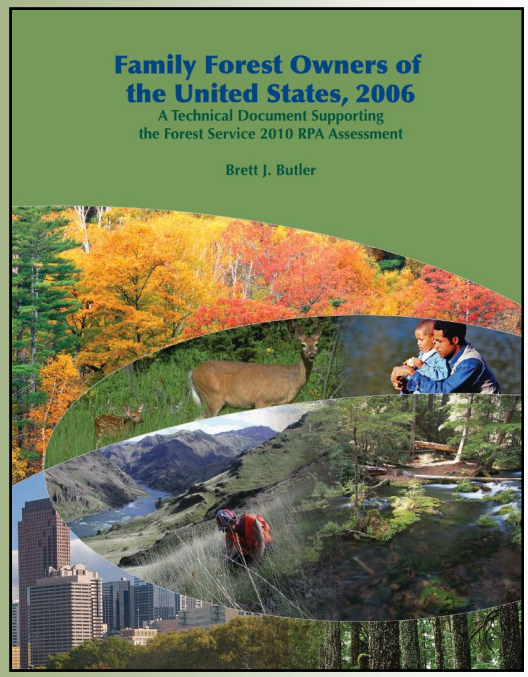
- Rural Residential Stewardship Initiative
  - $27,200 NFWF grant (+$15,699 in-kind match)
  - Fall 2005 - Spring 2006
  - 25 acre goal; planted 22.24 acres (-4.8 acres)
  - 12 landowners in 2 subdivisions (Kimberly and Bernoudy Farms)
- Valleys Reforestation Initiative
  - $50,000 NFWF grant (+$20,595 in-kind match)
  - Spring 2008 – Fall 2009
  - 21.7 acre goal; planted 26.3 acres
  - 8 rural property owners, 2.12 linear miles of streams

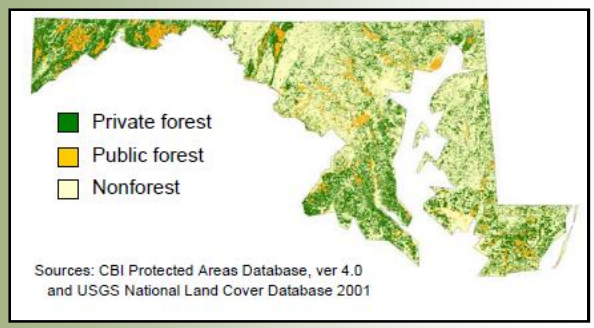
Landowner Barriers

- Perceived role as a land/resource manager

  "I didn't want all of this land, it just came with the house."

- Knowledge of forest ecosystems – tree species, reforestation, maintenance
- Planting equipment
- Legal aspects – restrictive deed covenants
- Costs (attorneys, easement recordation)
- Community conformance and expectations (nature v. McMansions)





National Woodland Owner Survey
http://www.treesearch.fs.fed.us/pubs/15758

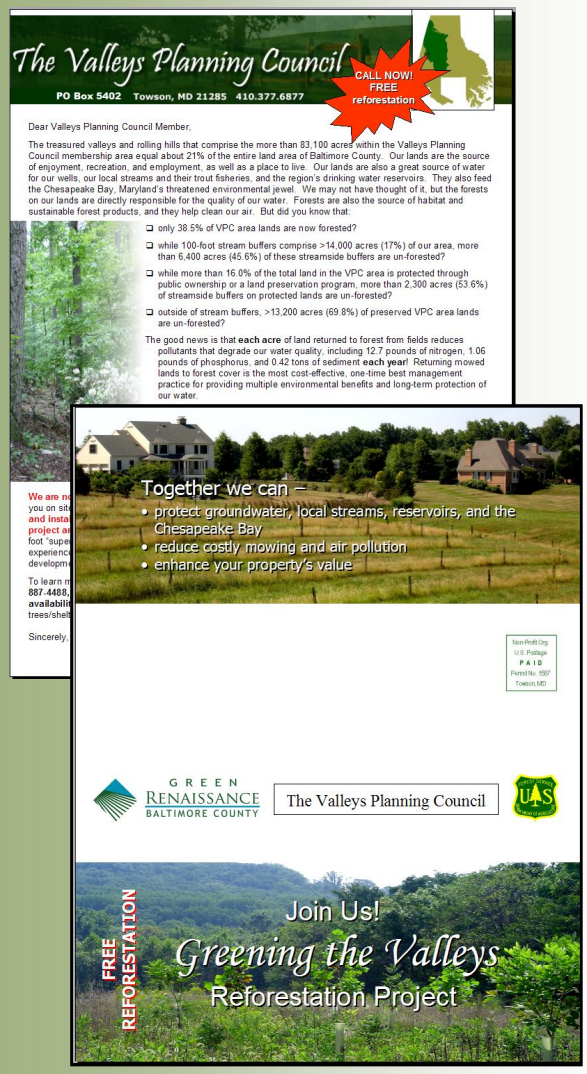
MD Forest Land Ownership

- 76% of forestlands in MD are privately-owned
- Forests are associated with owner's residence for 83% of MD forest owners
- Private forestland is mostly owned by retirees, craft workers, administrative & professionals, and then farmers
- 17.5% of all forestlands are in ownerships of ≤ 9 acres, but account for 84% of owners; only 2.3% of owners manage forestlands >100 acres, accounting for 49% of forest acres
- The vast majority of forestland owners hold land for non-timber reasons and do not plan forest operations in the next 5 years
- 90% of owners (54% of acres) do not have a management plan, and 96% of owners (75% of acres) have never participated in cost share programs

County Role

- recruit participation of landowners – subdivision meetings
- design reforestation projects with landowners (“walk and talk”)
- provide equipment (truck, tractor,trailer, hardwood seedling planter)
- provide supplies (trees, seedlings, shelters, rodenticide, fertilizer)
- prepare sites and install reforestation
- train landowners to monitor and maintain reforestation areas

Partnerships and Recruitment



- Rural Residential Stewardship Initiative
  - Greater Baltimore Group of the Sierra Club – 2 special issues of *Baltimore Sierran* newsletter to educate about riparian buffers, forest sustainability; sent to 1,900 members
  - Gunpowder Valley Conservancy – recruitment for Kimberly subdivision
- Valleys Reforestation Initiative
  - Valleys Planning Council – flyer to membership (600 families)

Lesson

- Rural residential owners not likely to be familiar with land conservation organizations

Environmental Outcomes

Borden property – planted 2009

Shaper property – planted 2009

Rural Residential Stewardship Initiative

- planted 3,109 trees on 22.24 acres (17.44 net)
- 222 lbs. N, 19 lbs P, 7 tons sediment (net acres)

Valleys Reforestation Initiative

- planted 4,880 trees on 26.3 acres
- 293 lbs N, 25 lbs P, 10 tons sediment reduced
- used 2002 MD loads (#/ac/yr) from Bay Model

	TN	TP	Sediment (tons)
agriculture	14.105	1.083	0.449
forest	1.378	0.018	0.035

- farm loads are 12, 60, and 13 times greater
- annual benefits, assumed at maturity

other ecosystem/energy benefits (reduced mowing)

New Bay WIP Criteria for Reforestation

- Pollution reduction credits vary by watershed and % of load delivered (e.g., Baltimore County gets “0” credit for any BMP’s in Liberty Reservoir watershed; model assumes 1/3 of Loch Raven Reservoir loads are delivered)
- Bay WIP approach is the difference between nutrient loads delivered per acre of “pervious urban” area and “forest.”
- Countywide delivered load averages for Baltimore County:

Pervious urban	4.93 lbs/ac **N**	0.17 lbs/ac **P**
Forest	0.94	0.02
Reforestation	**3.99**	**0.15**

- Reforestation credit is significantly less than our “outcomes” for our rural residential reforestation grant projects**.**

Reforestation Project Costs

Rural Residential Stewardship Initiative (22.24 ac.)

- $1,500 Sierra Club + $530 Gunpowder Valley Conservancy
- $19,877 planting crew salaries/benefits (993 hrs.)
- $7,226 trees, shelters/stakes, fertilizer, rodenticide
- $5,293 equipment charge

Valleys Reforestation Initiative (26.3 ac.)

- $1,124 Valleys Planning Council (staff & postage)
- $33,386 planting crew salaries/benefits (1,858 hrs.)
- $16,615 trees, shelters/stakes, fertilizer, rodenticide
- $6,393 equipment charge & fuel

Continuing Landowner Monitoring and Maintenance

- Priceless!

Cost Comparisons/Unit Costs

	RRSI	VRI
Acres Planted	22.24	26.30
Trees Planted	3,109.00	4,880.00
Trees/Acre	139.79	185.55
Total Cost	$ 42,899.00	$ 70,595.00
Total Cost/Acre	$ 1,928.91	$ 2,684.22
Total Cost/Tree	$ 13.80	$ 14.47
Grant Cost (-Match)	$ 27,200.00	$ 50,000.00
Match	$ 15,699.00	$ 20,595.00
G Cost/Acre	$ 1,223.02	$ 1,901.14
G Cost/Tree	$ 8.75	$ 10.25

All costs above exclusive of land-owner monitoring and maintenance

Typical cost of a stormwater facility retrofit: $150,000

Project Cost Variables:

- tree size class and cost
- labor rates
- supplies (shelters etc)
- planting density
- travel (distance to nursery)
- site size, topography, fragmentation; manual v. mechanical planting

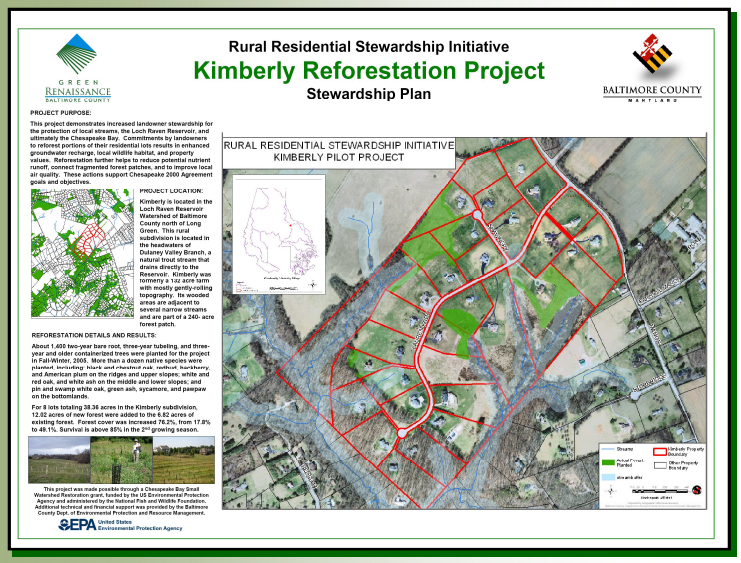
Match Components:

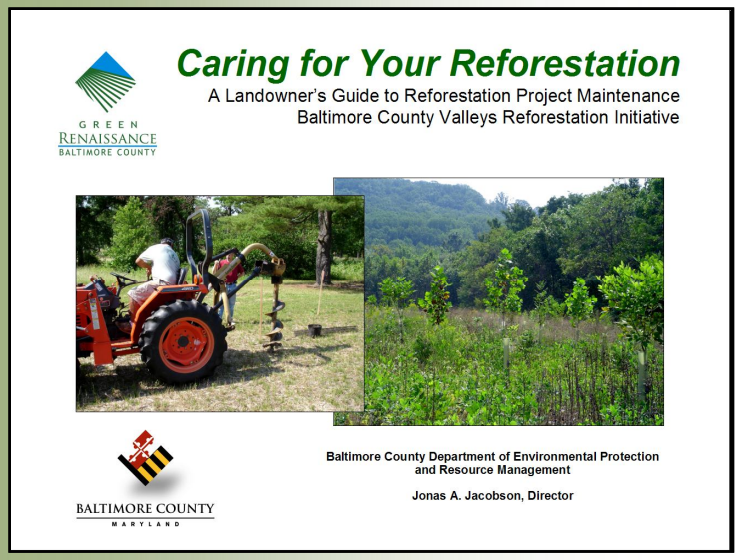
- grant management
- partner organizations
- reforestation design
- planting equipment
- GIS/GPS support
- landowner coordination

Mowing Options

- preferred – once per year, end-of-season mowing to eliminate colonization of invasive species/vines, with a reduction in mowing over time as shade increases
- continuation of existing mowing as meets the aesthetic needs of lot owners, recognizing that mowing should be phased out in 5± years
- no mowing, recognizing the need to selectively control invasive weeds/vines

Post-Reforestation





- Each participant received a graphic plan and project description
- Each participant received a maintenance guide: "*Caring for Your Reforestation*"
- Periodic follow-up emails, site visits
- EPS continues to provide limited technical assistance
  - Enrollment in forest management programs (property tax reduction)
  - Assistance with contacts for invasives spraying
- Follow-up maintenance

Landowner Reforestation Plans

Valleys Reforestation Initiative
Reforestation Plan for Zodhiates/Ciman Property

PROJECT PURPOSE:

This project was designed to increase water quality protection in local streams draining portions of the Loch Raven and Prettyboy Watersheds, and flowing ultimately to the Chesapeake Bay, by partnering with landowners to increase forest cover in ecologically sensitive areas on their properties through reforestation. The commitments made by these rural landowners will result in enhanced groundwater recharge, local wildlife habitat, and property values. Reforestation further helps to reduce potential nutrient runoff and soil erosion, to connect fragmented forest patches, and to improve local air quality. These actions support the Chesapeake 2000 Agreement goals and objectives.

PROJECT LOCATION:

The Valleys Planning Council service area is located west of Interstate 83 in the Loch Raven and Prettyboy Watersheds. It covers 83,159 acres or 21% of Baltimore County 's land area. The Baltimore County Department of Environmental Protection and Resource Management (DEPRM) selected eight properties for reforestation. The map at left shows six of the properties that have areas draining to tributaries of the Western Run, which itself joins the Gunpowder Falls as it enters the Loch Raven Reservoir. To the north, the remaining two properties with reforestation sites have portions draining to two tributaries that enter the Prettyboy Reservoir directly.

Vicinity map showing clusters (red dots) of reforestation sites near the Western Run and to the north, the Prettyboy Reservoir.

REFORESTATION DETAILS AND RESULTS:

In the fall of 2008 and the spring of 2009, the DEPRM reforestation crew planted 1252 two-year tubeling and three-year and older containerized trees on the floodplains, wetland edges and uplands surrounding Compass Run, as shown in the map to the right. A total of 7 major native tree species were planted, including red, black, white, scarlet, and chestnut oak in the upland fields, and red, pin, and swamp white oak in the bottomlands. In addition, the understory native species persimmon and redbud were added for interest and species diversity. The strategic placement of the reforestation plantings on both sides of Compass Run will enhance the existing stream bank vegetation's capacity to slow soil erosion and nutrient loading into the stream, and to increase stream bank stability. The upland field planting will increase forest habitat diversity for forest-dependent wildlife.

This project was made possible through a Chesapeake Bay Small Watershed Restoration grant, funded by the US Environmental Protection Agency and administered by the National Fish and Wildlife Foundation. Additional technical and financial support was provided by the Baltimore County Department of Environmental Protection and Resource Management.

EPA United States Environmental Protection Agency

BALTIMORE COUNTY MARYLAND

GREEN RENAISSANCE BALTIMORE COUNTY

Zodhiates-Ciman Property

10.76 acres planted
41.2 acres existing forest
51.9 acres after reforestation

89.5 acres total land
46.0% existing forest
58.0% after reforestation

540ft stream buffer length reforested

0 250 500 1,000 Feet

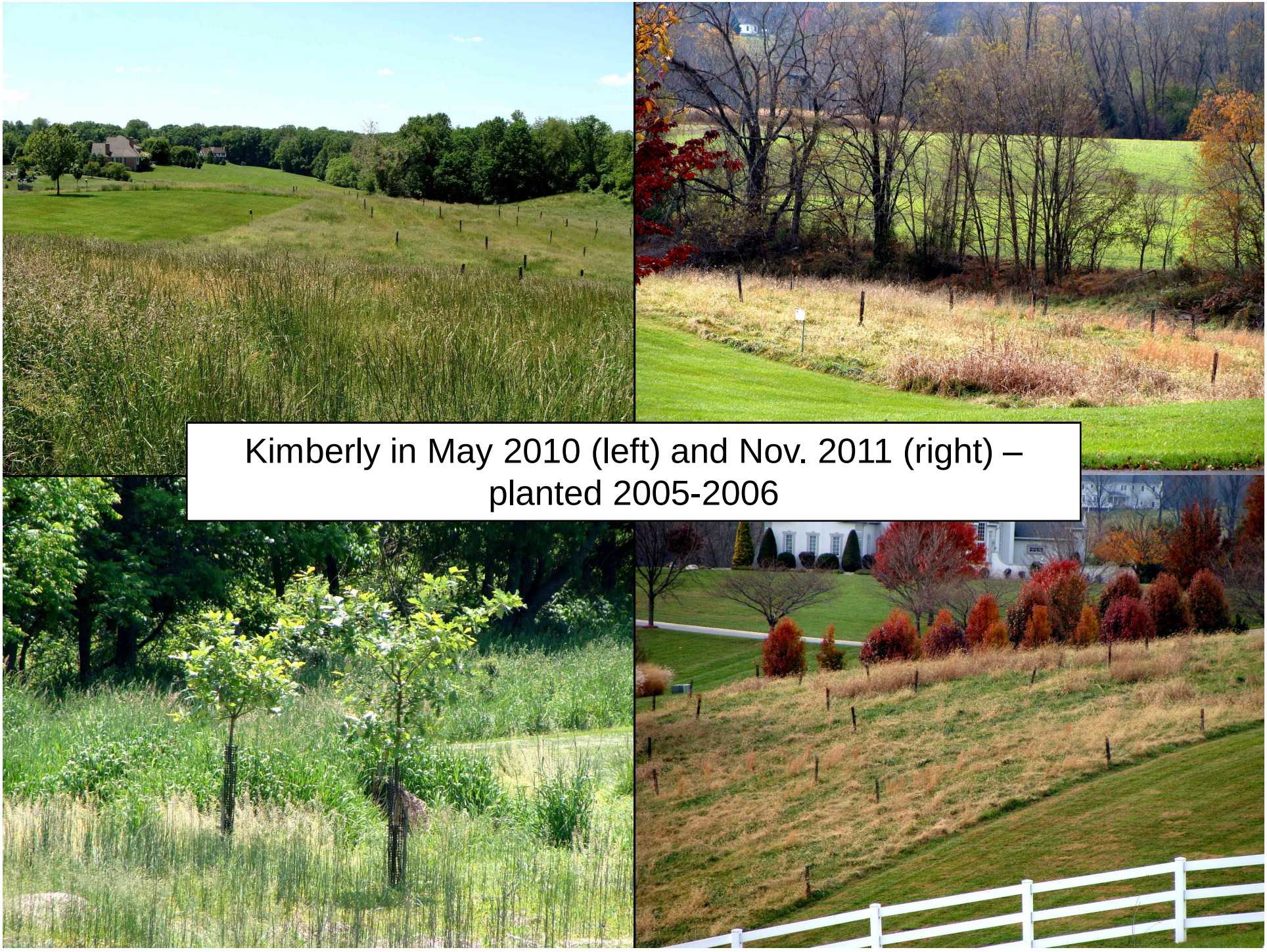
Streams and Creeks
Buffered Streams
Reforestation Area
Property Boundary

Prepared by Geographic Information Serives, Baltimore County Department of Environmental Protection and Resource Management
10.15.2009 R:\Depts\DEPRM\Editing\PERC\VRI_mapbook.mxd

Maintenance Focus

- Retract bird netting
- Straighten/clean out tree shelters, avoid mowers
- Control/spray vines and noxious weeds such as Canada Thistle

Deer browse damage



Kimberly in May 2010 (left) and Nov. 2011 (right) – planted 2005-2006

Bernoudy Farms in May 2010 - planted 2005-2006

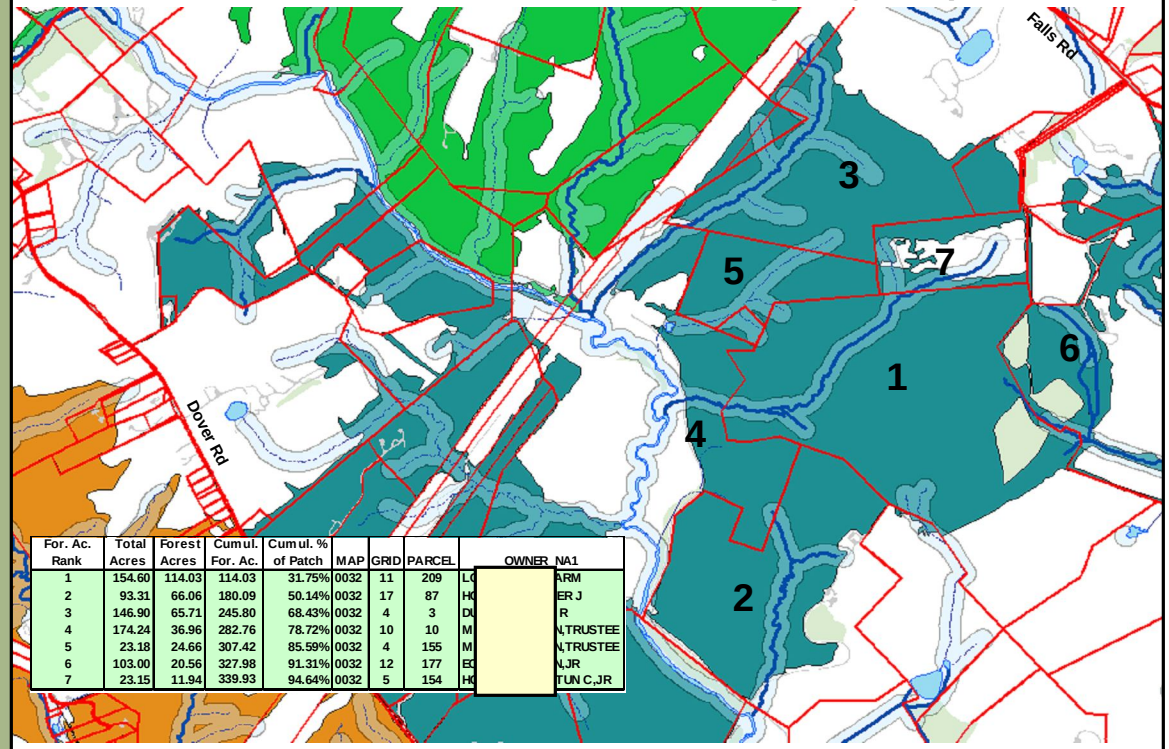
Observations and Recommendations

- Long-term cost-effectiveness and success are probably better served by installing larger deer-resistant shelters.
- Planting design needs to better balance mid- to long-term forest structure with short-term goals of reforestation.

- Each site and owner are different.
- Sites cropped for many years will be especially nutrient deficient.
- Need to assure HOA is supportive of reforestation on individual lots.
- Landowners can provide continuing maintenance and change mowing practices.
- Contractual mowers need to avoid damage to tree shelters.
- Landowners need assistance with control of regulated noxious weeds if frequent mowing is not adopted.
- After initial planting, projects need to provide for replacement of dead trees.
- Most grant programs are inadequate to do this work successfully.

Multi-owner Patch-based SFM

Forest Patch #178: 359.19 acres (Piney Run)



For. Ac. Rank	Total Acres	Forest Acres	Cumul. For. Ac.	Cumul. % of Patch	MAP	GRID	PARCEL	OWNER_NA1
1	154.60	114.03	114.03	31.75%	0032	11	209	LC ARM
2	93.31	66.06	180.09	50.14%	0032	17	87	HC ER J
3	146.90	65.71	245.80	68.43%	0032	4	3	DU R
4	174.24	36.96	282.76	78.72%	0032	10	10	M N,TRUSTEE
5	23.18	24.66	307.42	85.59%	0032	4	155	M N,TRUSTEE
6	103.00	20.56	327.98	91.31%	0032	12	177	ED N,JR
7	23.15	11.94	339.93	94.64%	0032	5	154	HC TUN C,JR

Map numbers key to table of owners, ranked by size of forest in patch

- neighbors work together
- start with a forest health assessment and management plan
- decide on management objectives
- use sustainable forestry practices
- apply for cost-share assistance

Recognizing Rural Residential Reforestation

Restoring Green Infrastructure

Rural Reforestation and Forest Stewardship Initiatives in Baltimore County

These model programs have planted nearly 40 acres of forest on privately owned, suburban land, increasing the stewardship practices of the landowners and reducing the amount of sediment and nutrients that enter local waterways and the Chesapeake Bay.

CASE STUDY SUMMARY

The Department of Environmental Protection and Resource Management (DEPRM) in Baltimore County, Maryland, developed and implemented two versions of a rural reforestation initiative to meet its resource management challenges and help landowners become better

divisions with lots of three or more acres. The landowners converted mowed, "excess" lawn and fields to forest cover, expanding riparian buffers and contiguous forest patches. The second project, the Valleys Reforestation Initiative in 2008 and 2009, involved reforestation of larger rural properties. Reforestation was

rest patches
Prettyboy
which are part
r basin of the
rshed.

DEPRM worked to reduce rural landowners' perceived barriers to beneficial stewardship practices, including costs, technical knowledge of reforestation, and legal consequences of required easements for reforestation areas. DEPRM's experience with these projects supports the conclusion that using education, reducing barriers, and providing technical and financial incentives is just as necessary to achieve successful stewardship for rural residential landowners as it is for farmers.

In all, the two projects resulted in a total of 38.7 acres of reforestation on lands owned by 19 different landowners. Three different conservation organizations were also involved in the projects. Both projects were supported by the Chesapeake Bay Small Watershed Grants Program, administered by the National Fish and Wildlife Foundation.

RESOURCE MANAGEMENT CHALLENGE

The Rural Residential Stewardship Initiative and Valleys Reforestation Initiative addressed two major resource management challenges: (1) the loss of and need to replace critical forest resources for watershed health, and (2) the need to engage

Recover Habitat

Document return of fish. Beginning in 2012, FWS and NOAA will partner with states to document the presence of indicator species such as the American eel, river herring and American shad at fish passage projects after construction is complete. Where possible, these projects will be integrated into locally supported watershed management plans.

ADDITIONAL HABITAT ACTIONS

Following are five priority habitat recovery actions that address more than one habitat type and therefore will support achievement of more than one of the habitat measures.

Action Overview:

- Combat invasive species.
- Restore forest habitat.
- Restore living shorelines.

Restore forests in priority areas. By 2012, USDA will work with DOI and other federal entities to develop a Chesapeake Bay watershed strategy to maximize forest restoration in priority areas, including: residential land currently managed as lawn; areas covered by community tree canopy expansion and green infrastructure programs; gaps in core wildlife habitat; deficient lands such as abandoned mine lands, brownfields areas and lands with vulnerable soils; and agro-forestry areas. Specifically, beginning in 2012, USDA will provide grants to Bay counties with a high percentage of turf to develop programs that target landowners with large lawns and offer to reforest portions of it, similar to Baltimore County's Rural Residential Stewardship program.

Restore living shorelines. In 2011, NOAA, USACE and FWS will work with Maryland and Virginia to prioritize critical segments for living
ne restoration and identify opportunities to
te implementation of living shorelines over
ed shorelines. Maryland and Virginia have
l detailed inventories of existing shoreline
ions (eroding, hardened, natural, accreting)
tely causes of these conditions (wind,
tides, boat wakes), and have recommended
s to improve conditions. In partnership
he Chesapeake Bay Trust, federal partners
verage funding and provide engineering
sign assistance for living shoreline projects
l governments and private homeowners.
E is preparing several shoreline
ement documents and guides as part of
ryland Shoreline Management Study to
plement Maryland's Living Shoreline
tion Act. In Accokeek, Maryland, NOAA is
g to restore living shorelines at Piscataway
long the Potomac River, providing
bitat and erosion protection, as well as
tion for 30 acres of freshwater wetland and
tened Native American archeological site.